HORTEB - Planning program for heat production by biomass fuels

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In feasibility studies a lot of parameters are considered to calculate the costs of biomass projects. Normally the results of this studies are non-transferable to other planning projects. To make this task easier the planning program HORTEB ("Horticultural Energy Supply with Biomass") was developed at the Institute for Horticultural and Agricultural Engineering of the University of Hannover. With this program the energetic use of biomass for heat production can be planned with consideration of complete process engineering chains. More than 200 working steps are included with equal term for calculations. For each individual case calculations of the heat production costs, the CO_2-emissions and the energy balances are made and compared with the use of fossil fuel oil and natural gas. So with the changeable price for fossil fuels (specified in the program) it is possible to determine the break-even point of biomass combustion.

On the basis a consumer, who wants to cover his heat demand totally or partly with biomass, can choose between different engineering process chains. The engineering process chains cover all procedures from the harvest of biomass, preparation to bio fuel, transportation, combustion to the application of ashes and the breaking of the field when energy plants were used. If data are unknown at the first plannig the program can complete these data and a comprehensive calculation can be realized.

The program includes 14 different building types which are characterised by different heat characteristics. The buildings are represented by duration curves. They are used to calculate the heat production and other planning options. The different building types are: two greenhouses (for ornamental plant and for vegetable production), residential buildings with different thermal insulation, low-energy building, hospital, school center, office building, two industrial companies as well as several swimming pools (all year round opened, closed in the summer, with additional equipment like restaurant or sauna). In addition an individual duration curve can be selected and changed for a better adaptation to the planning case.

After a solution is calculated, a multilateral solution sheet appears. As a result the total fuel requirement for the selected variation is shown. With the biogenous fuels, which comes directly of agricultural and forest areas, in addition the area requirement (floorspace) is called. To the comparison the given potentials in the district concerned are called.
In further results the heat production costs, the CO_2 emissions and the energy balance for the selected case is compared with exclusive fuel oil use and a 100% natural gas use. This comparison is represented also in graphic form. By changing some planing options (e.g. the price for fuels, transport distance, plant size and others) and making a new calculation with the program it is possible to find a better solution for this planning case. At least the most important results were shown in diagrams to have a quick look at the efficiency of the individual biomass combustion project.

The program HORTEB is suitable for making preliminary studies of project with energetical using of biomass regarding the caculation of heat production costs, CO_2 and energy balances. The potentials of different bio fuels in the concernd district are also called. The program has been tested by experts in the field of heat production, consultation and research of biomass

using. After that the program has been expanded and improved. It was released in winter 2000 and can be used form planning offices, energy agencies, energy consultants, research institutions and also from other interested people.